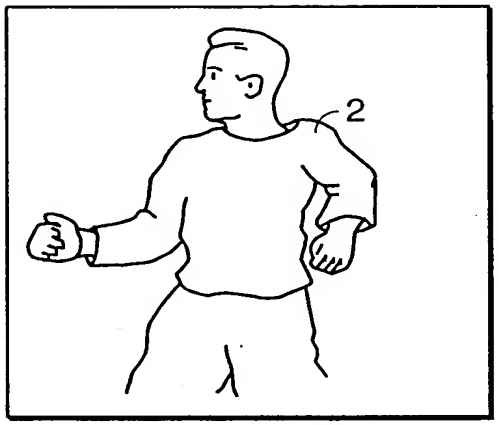

FIG. 1A

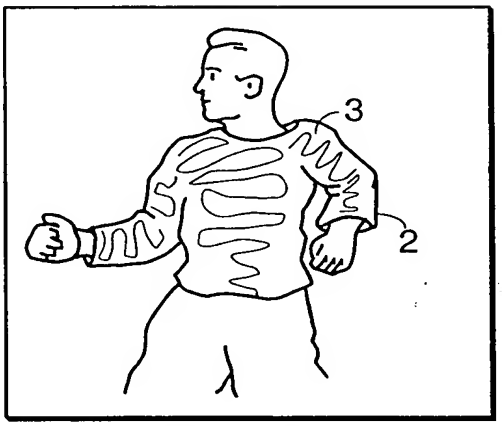

FIG. 1B

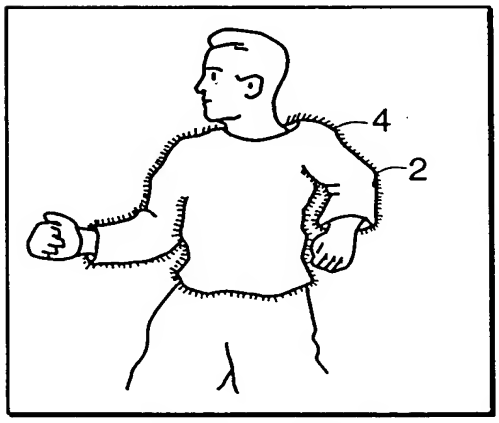

FIG. 1C

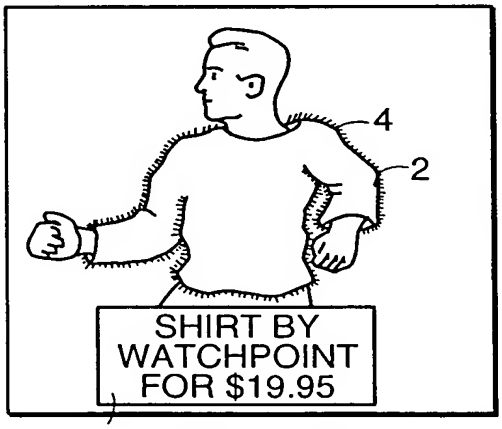

FIG. 1D

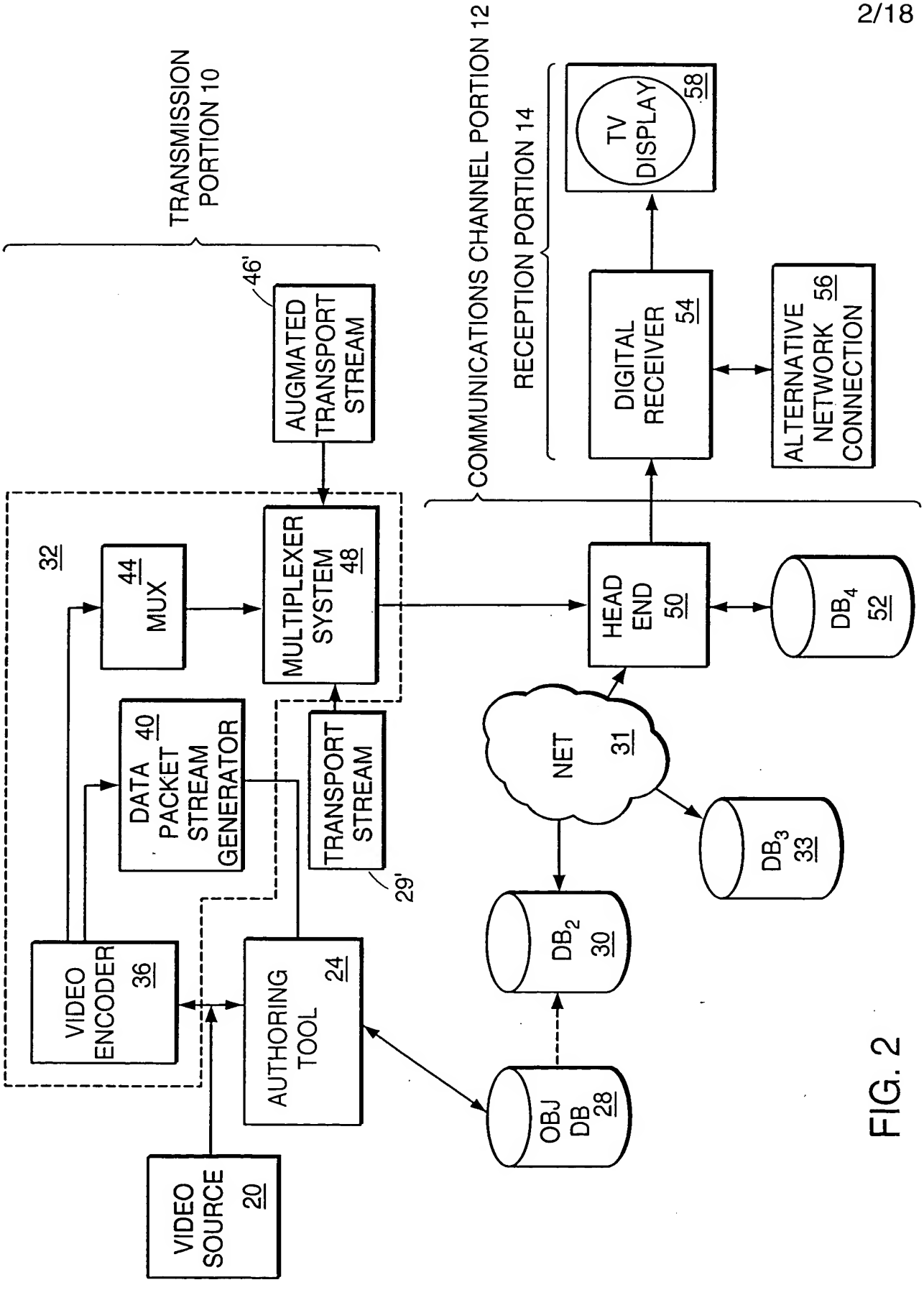
TRANSMISSION PORTION 10
COMMUNICATIONS CHANNEL PORTION 12
RECEPTION PORTION 14
VIDEO SOURCE 20
VIDEO ENCODER 36
AUTHORING TOOL 24
OBJ DB 28
DB2 30
NET 31
DB3 33
DB4 52
HEAD END 50
DIGITAL RECEIVER 54
ALTERNATIVE NETWORK CONNECTION 56
TV DISPLAY 58
32
44 MUX
MULTIPLEXER SYSTEM 48
DATA PACKET STREAM GENERATOR 40
TRANSPORT STREAM 29'
AUGMATED TRANSPORT STREAM 46'

FIG. 2

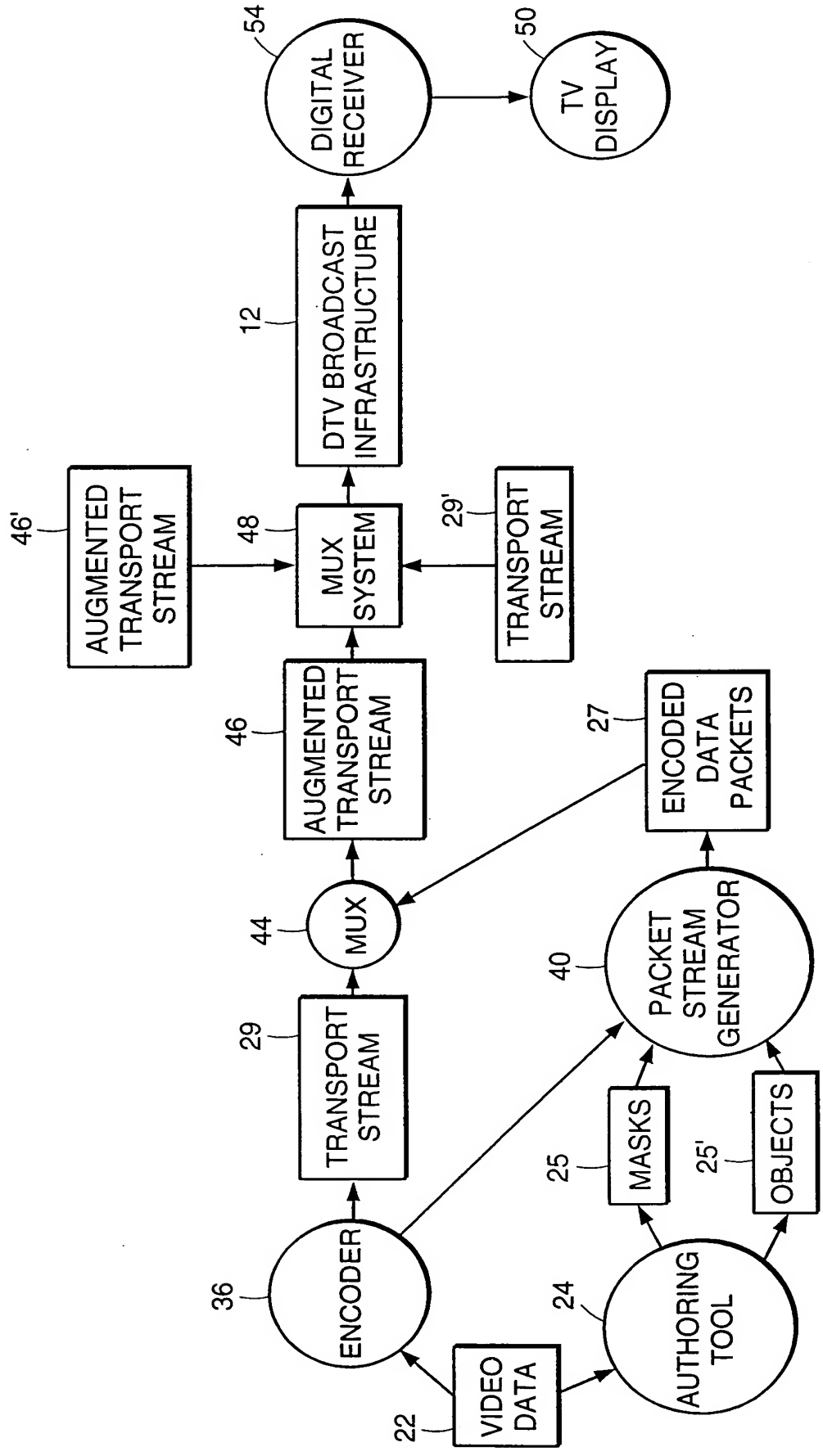
VIDEO DATA
22
AUTHORING TOOL
24
ENCODER
36
MASKS
25
OBJECTS
25'
PACKET STREAM GENERATOR
40
MUX
44
TRANSPORT STREAM
29
AUGMENTED TRANSPORT STREAM
46
ENCODED DATA PACKETS
27
AUGMENTED TRANSPORT STREAM
46'
MUX SYSTEM
48
TRANSPORT STREAM
29'
DTV BROADCAST INFRASTRUCTURE
12
DIGITAL RECEIVER
54
TV DISPLAY
50

FIG. 2A

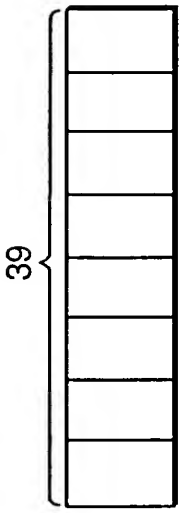

FIG. 2B

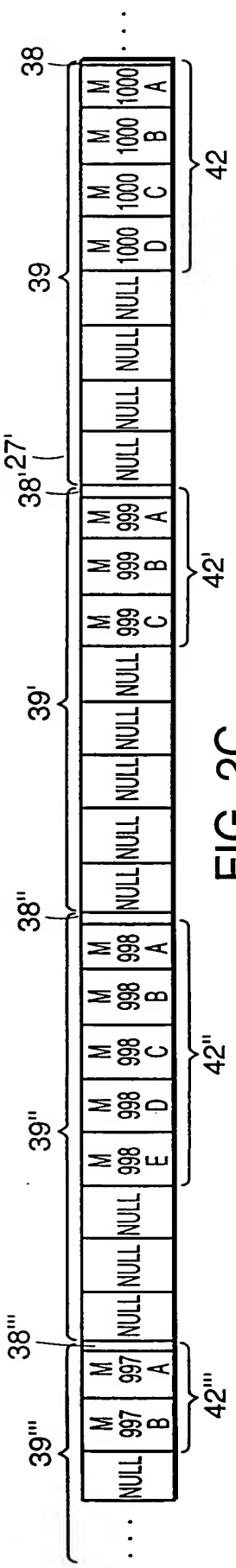

FIG. 2C

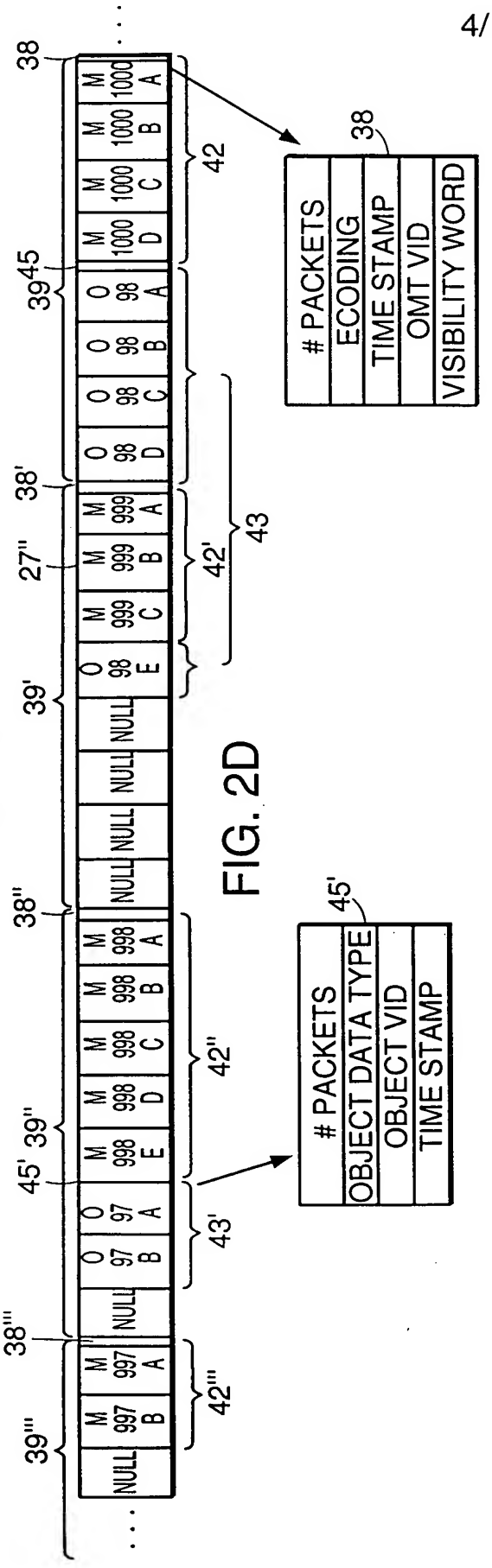

FIG. 2D

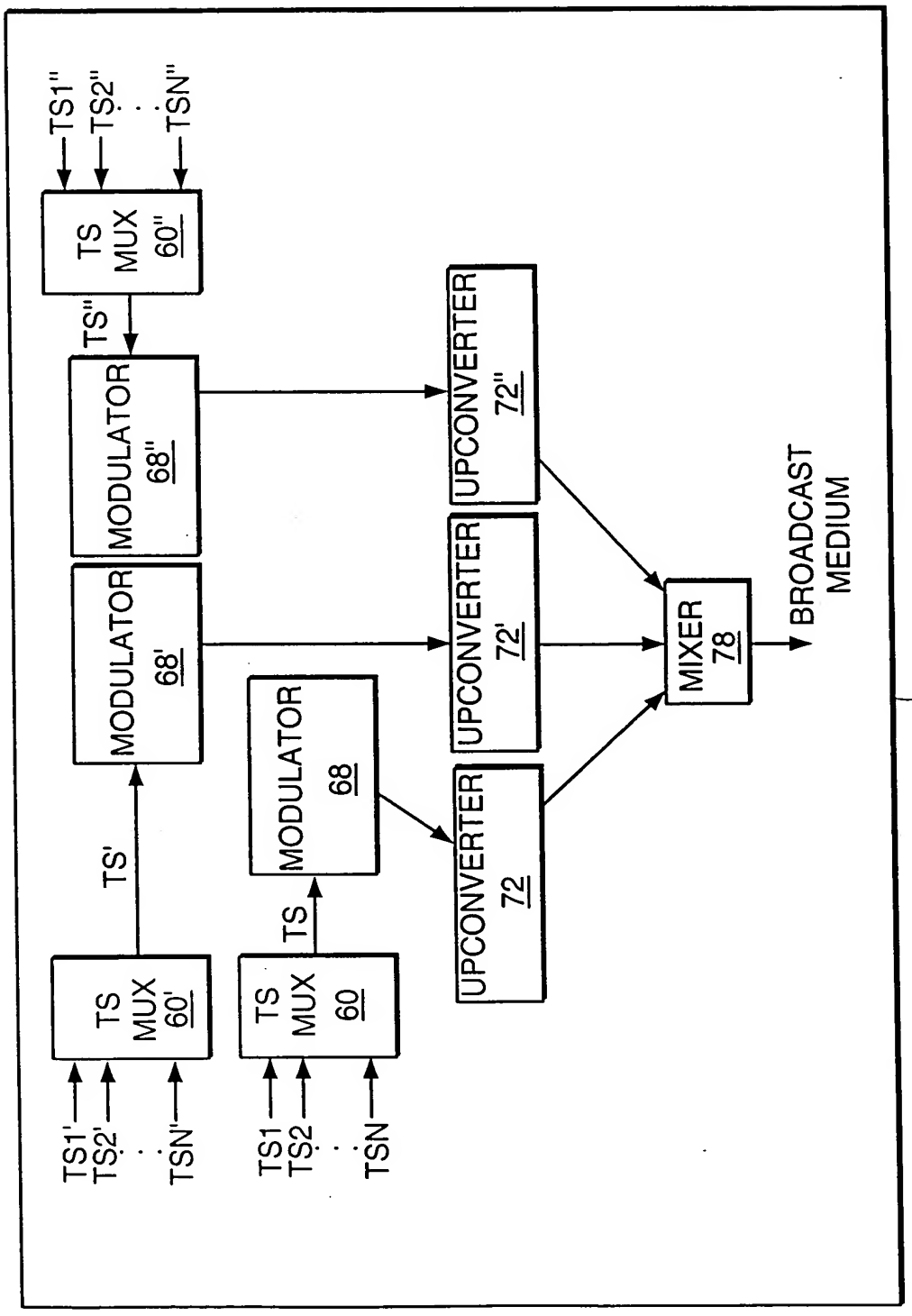
TS1''
TS2''
TSN''
TS MUX 60''
TS''
MODULATOR 68''
MODULATOR 68'
MODULATOR 68
TS'
TS
TS MUX 60'
TS MUX 60
TS1'
TS2'
TSN'
TS1
TS2
TSN
UPCONVERTER 72''
UPCONVERTER 72'
UPCONVERTER 72
MIXER 78
BROADCAST MEDIUM
48

FIG. 3

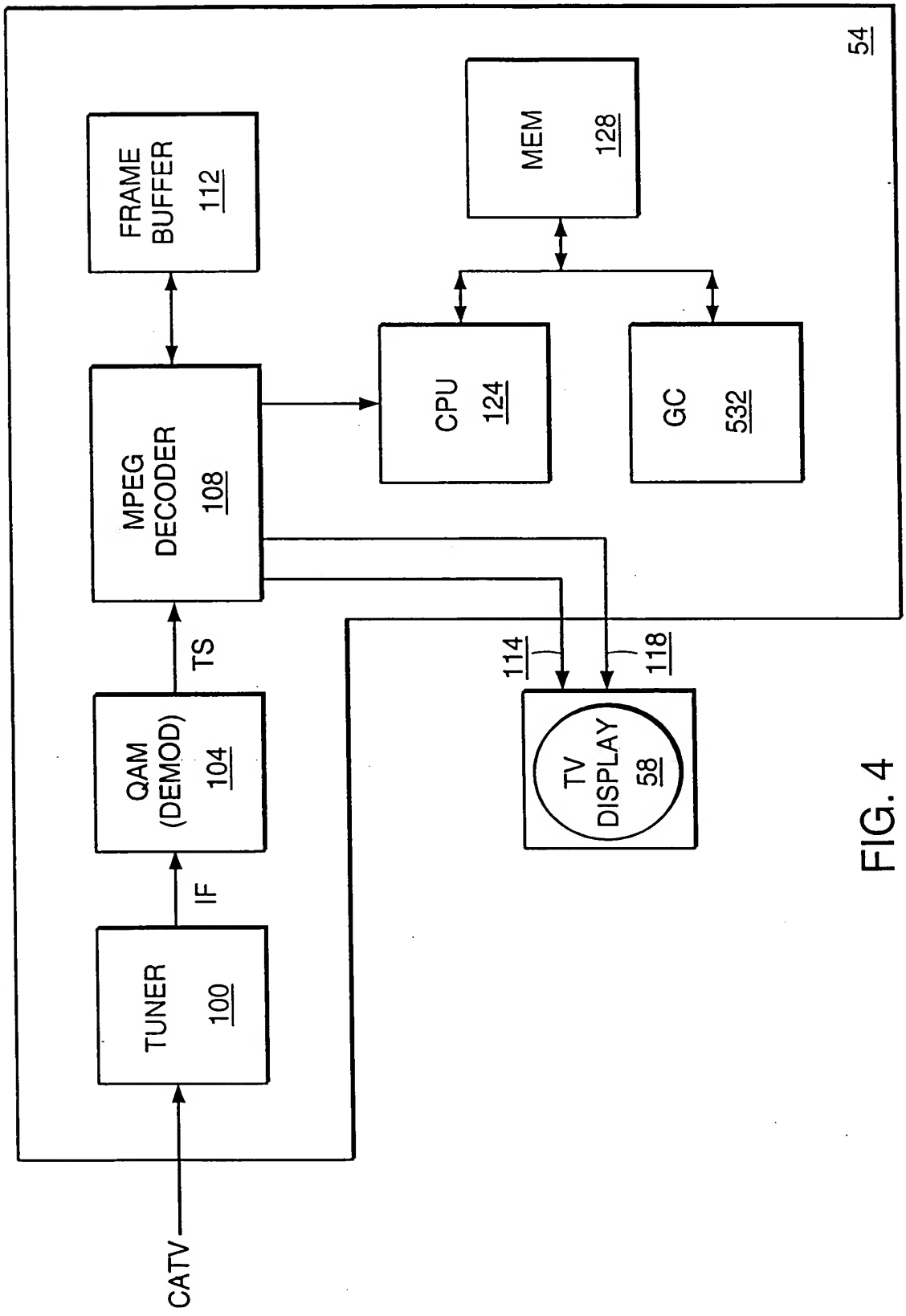
54
FRAME BUFFER 112
MEM 128
CPU 124
GC 532
MPEG DECODER 108
TS
QAM (DEMOD) 104
IF
TUNER 100
CATV
114
118
TV DISPLAY 58

FIG. 4

FIG. 5-1	FIG. 5-2

FIG. 5

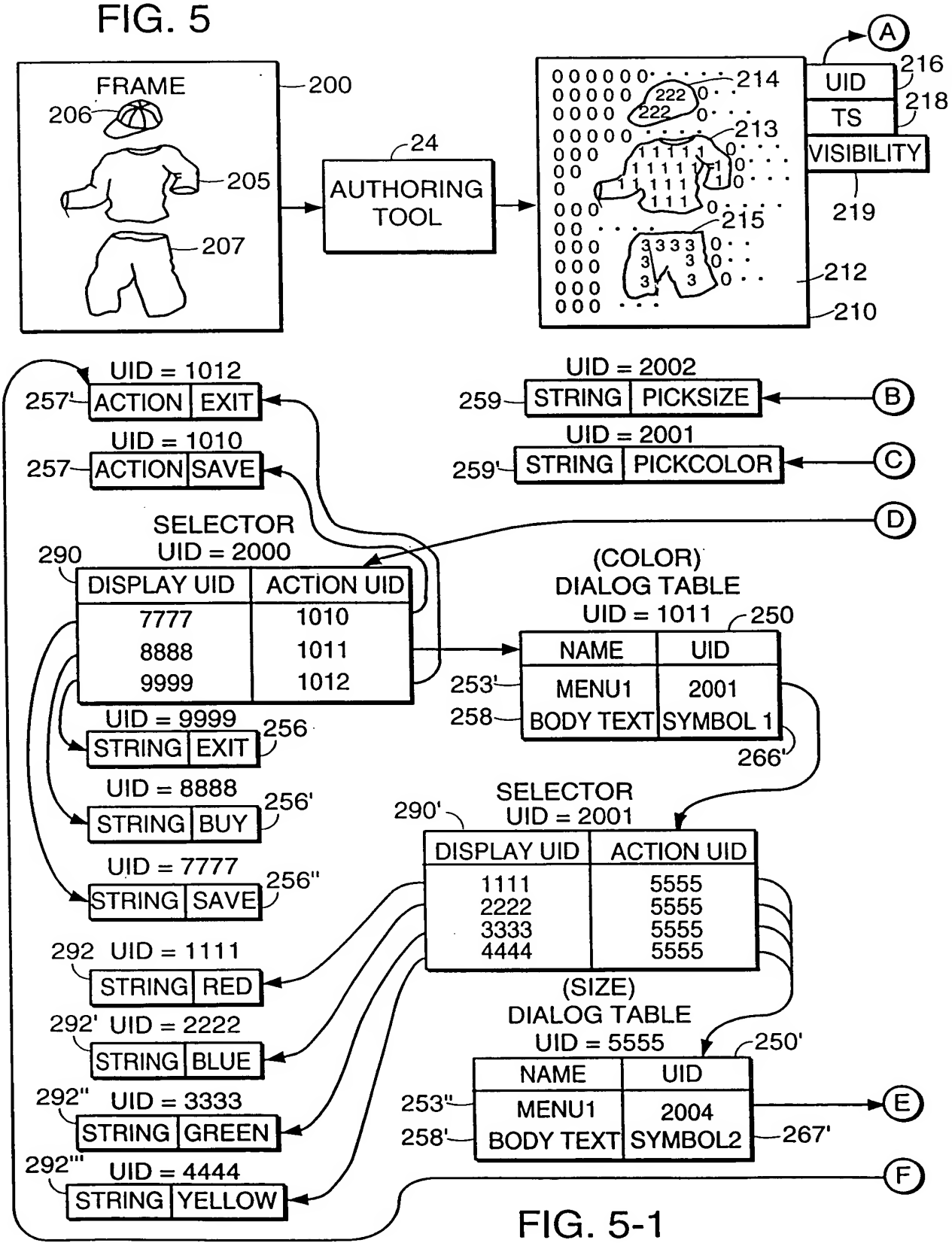

FIG. 5-1

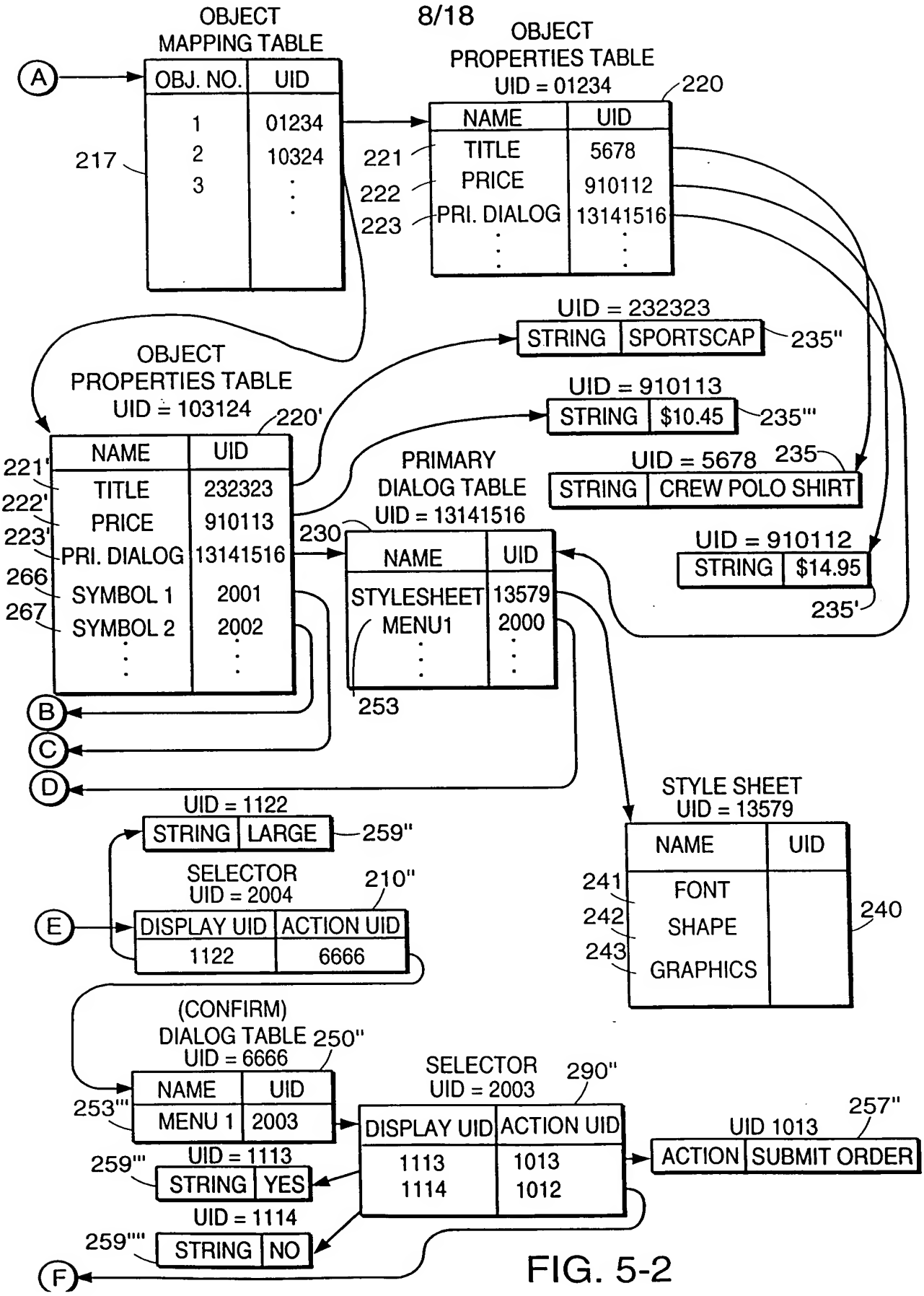
OBJECT MAPPING TABLE
OBJ. NO.
UID
1
2
3
01234
10324
217
A
OBJECT PROPERTIES TABLE
UID = 01234
220
NAME
UID
TITLE
PRICE
PRI. DIALOG
5678
910112
13141516
221
222
223
UID = 232323
STRING
SPORTSCAP
235"
OBJECT PROPERTIES TABLE
UID = 103124
220'
UID = 910113
STRING
$10.45
235'''
NAME
UID
TITLE
PRICE
PRI. DIALOG
SYMBOL 1
SYMBOL 2
232323
910113
13141516
2001
2002
221'
222'
223'
266
267
PRIMARY DIALOG TABLE
UID = 13141516
230
UID = 5678
235
STRING
CREW POLO SHIRT
NAME
UID
STYLESHEET
MENU1
13579
2000
253
UID = 910112
STRING
$14.95
235'
B
C
D
STYLE SHEET
UID = 13579
NAME
UID
FONT
SHAPE
GRAPHICS
241
242
243
240
UID = 1122
STRING
LARGE
259"
SELECTOR
UID = 2004
210"
E
DISPLAY UID
ACTION UID
1122
6666
(CONFIRM)
DIALOG TABLE 250"
UID = 6666
NAME
UID
MENU 1
2003
253'''
SELECTOR
UID = 2003
290"
DISPLAY UID
ACTION UID
1113
1114
1013
1012
257"
UID 1013
ACTION
SUBMIT ORDER
259'''
UID = 1113
STRING
YES
UID = 1114
259''''
STRING
NO
F

FIG. 5-2

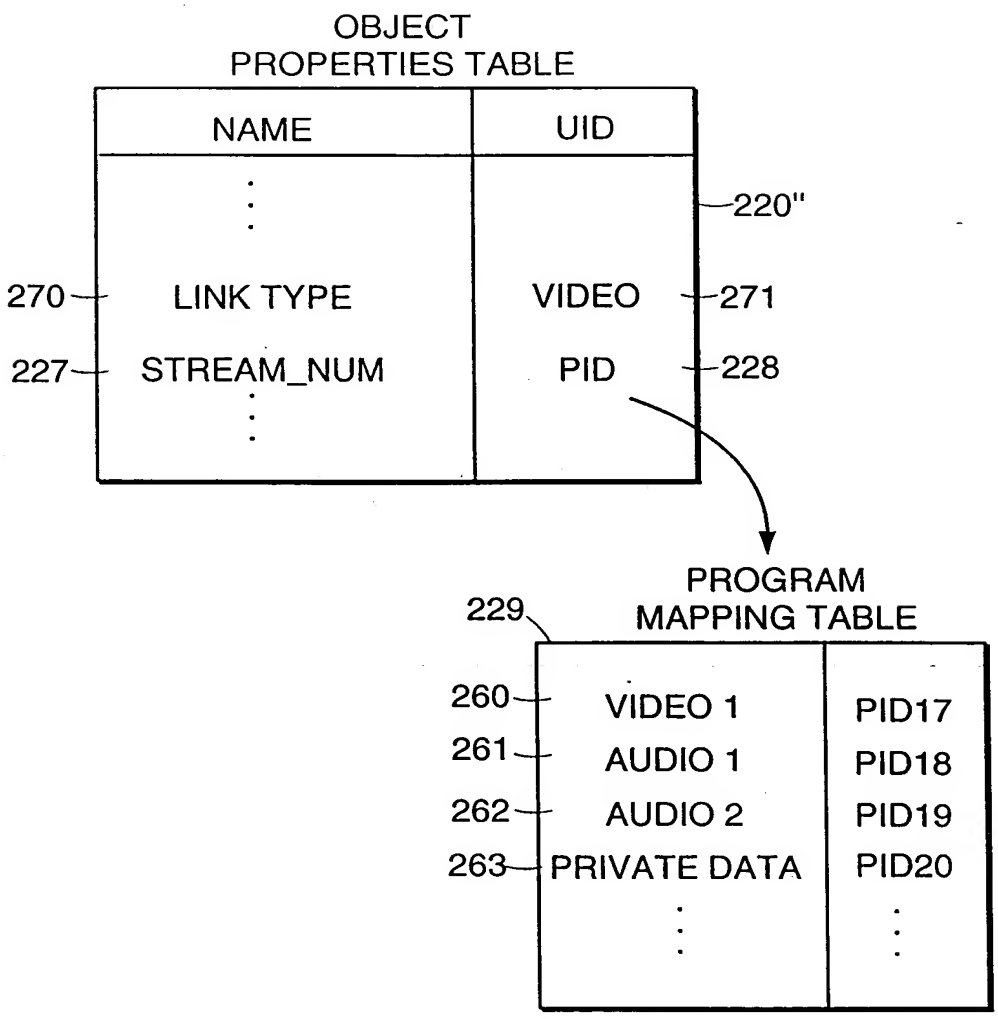
OBJECT
PROPERTIES TABLE
NAME
UID
220"
270
LINK TYPE
VIDEO
271
227
STREAM_NUM
PID
228
PROGRAM
MAPPING TABLE
229
260
VIDEO 1
PID17
261
AUDIO 1
PID18
262
AUDIO 2
PID19
263
PRIVATE DATA
PID20

FIG. 5A

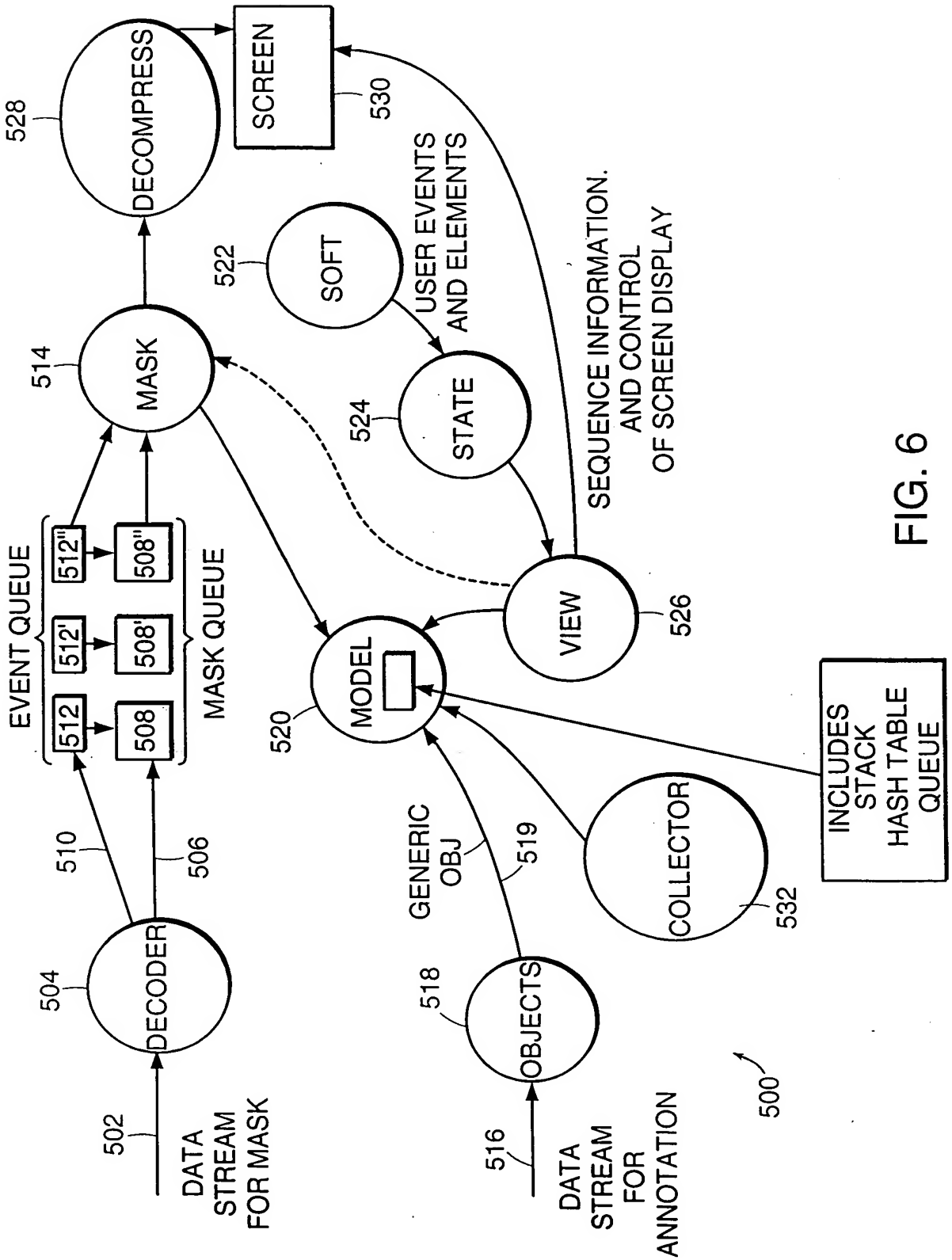
DECOMPRESS
528
SCREEN
530
SOFT
522
USER EVENTS AND ELEMENTS
MASK
514
STATE
524
SEQUENCE INFORMATION. AND CONTROL OF SCREEN DISPLAY
EVENT QUEUE
512"
512'
512
508"
508'
508
MASK QUEUE
VIEW
526
MODEL
520
INCLUDES STACK HASH TABLE QUEUE
510
506
GENERIC OBJ
519
COLLECTOR
532
DECODER
504
OBJECTS
518
502
DATA STREAM FOR MASK
516
DATA STREAM FOR ANNOTATION
500

FIG. 6

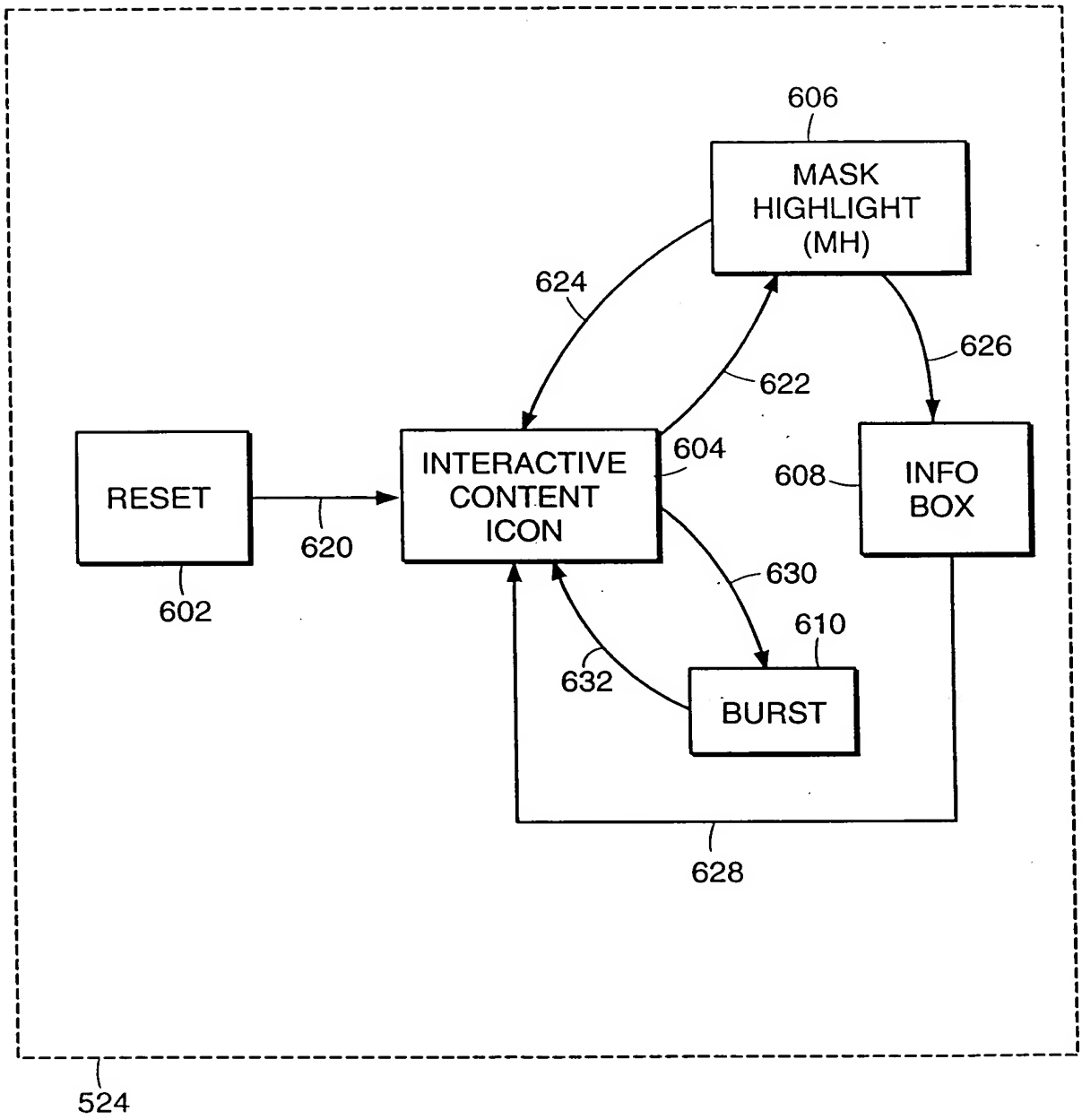
606
MASK HIGHLIGHT (MH)
624
626
622
RESET
INTERACTIVE CONTENT ICON
604
608
INFO BOX
620
602
630
610
632
BURST
628
524

FIG. 7

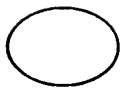

FIG. 8A

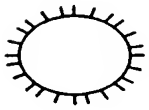

FIG. 8B

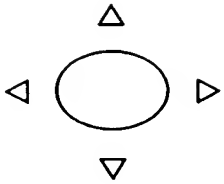

FIG. 8C

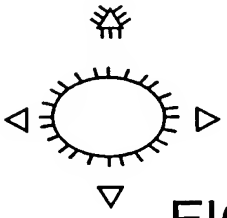

FIG. 8D

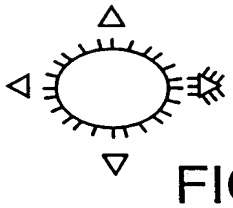

FIG. 8E

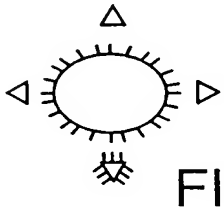

FIG. 8F

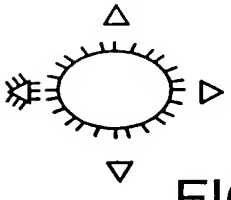

FIG. 8G

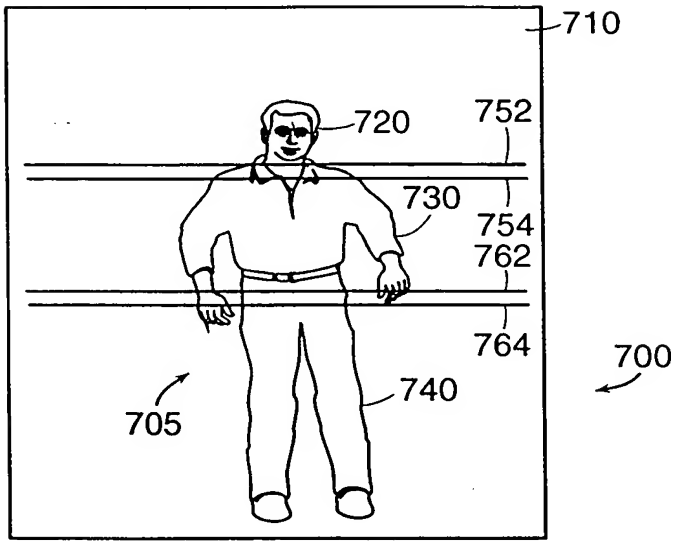

FIG. 9A

NO. ROWS (=3)
ROW 1: ($COLOR_1$, N_1), ($COLOR_2$, N_2), ($COLOR_3$,N_3), ... ($COLOR_N$, N_N)
ROW 2: N_1, N_2, N_3, ..., N_N
ROW 3: N_1, N_2, N_3, ..., N_N

FIG. 9B

(VALUE INDICATOR OF COLOR, RUN LENGTH, OFFSET)

FIG. 9C

NO. ROWS (=3)
ROW 1: ($COLOR_1$, $RUNLENGTH_1$,$OFFSET_1$), ($COLOR_2$, $RUNLENGTH_2$,$OFFSET_2$) ....($COLOR_N$, $RUNLENGTH_N$,$OFFSET_N$)
ROW 2: ($RUNLENGTH_1$,$OFFSET_1$), ($RUNLENGTH_2$,$OFFSET_2$),....($RUNLENGTH_N$,$OFFSET_N$)
ROW 3: ($RUNLENGTH_1$,$OFFSET_1$), ($RUNLENGTH_2$,$OFFSET_2$),....($RUNLENGTH_N$,$OFFSET_N$)

FIG. 9D

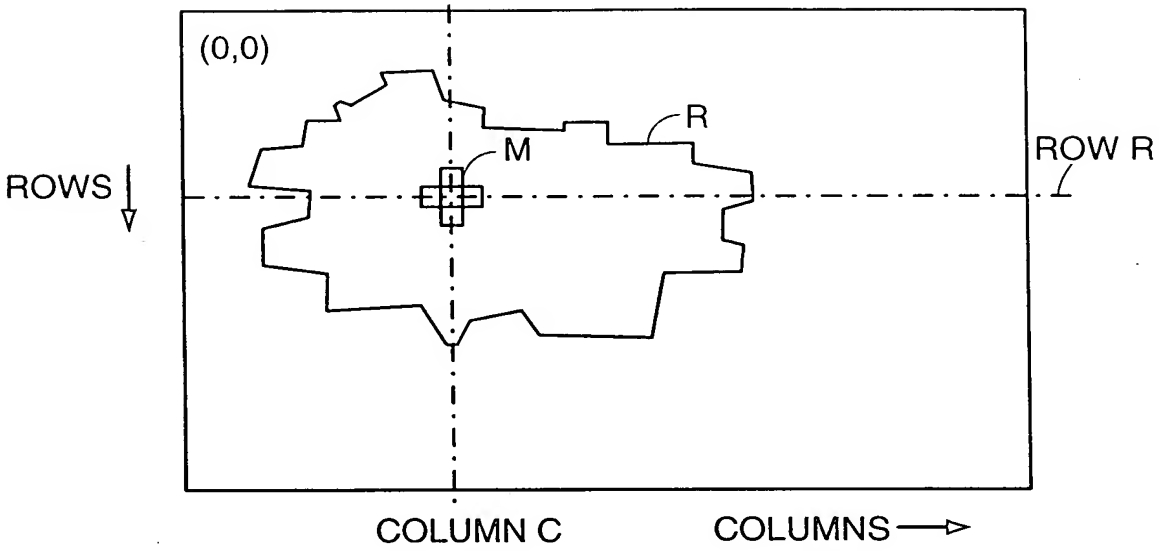

FIG. 10A

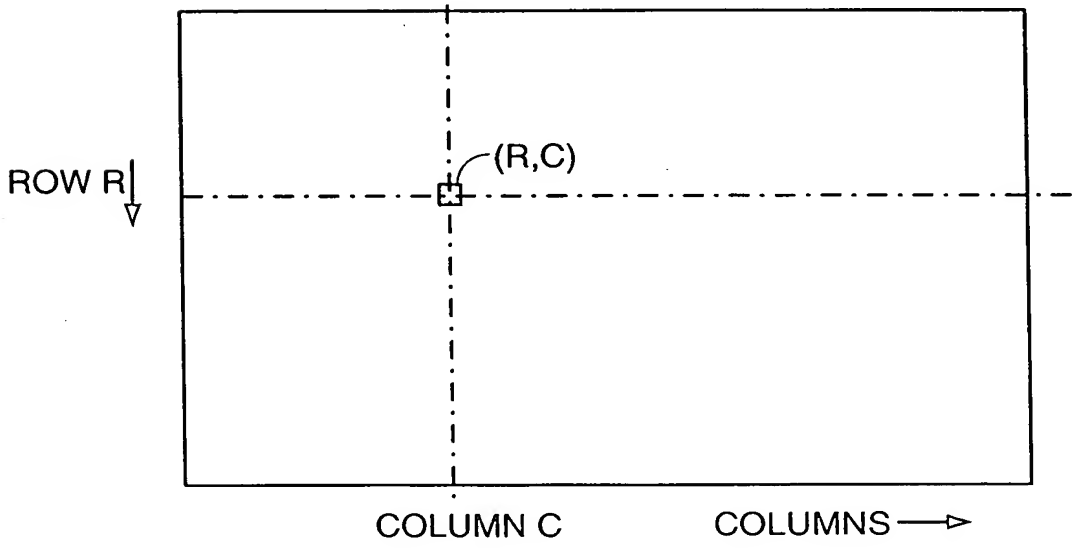

FIG. 10B

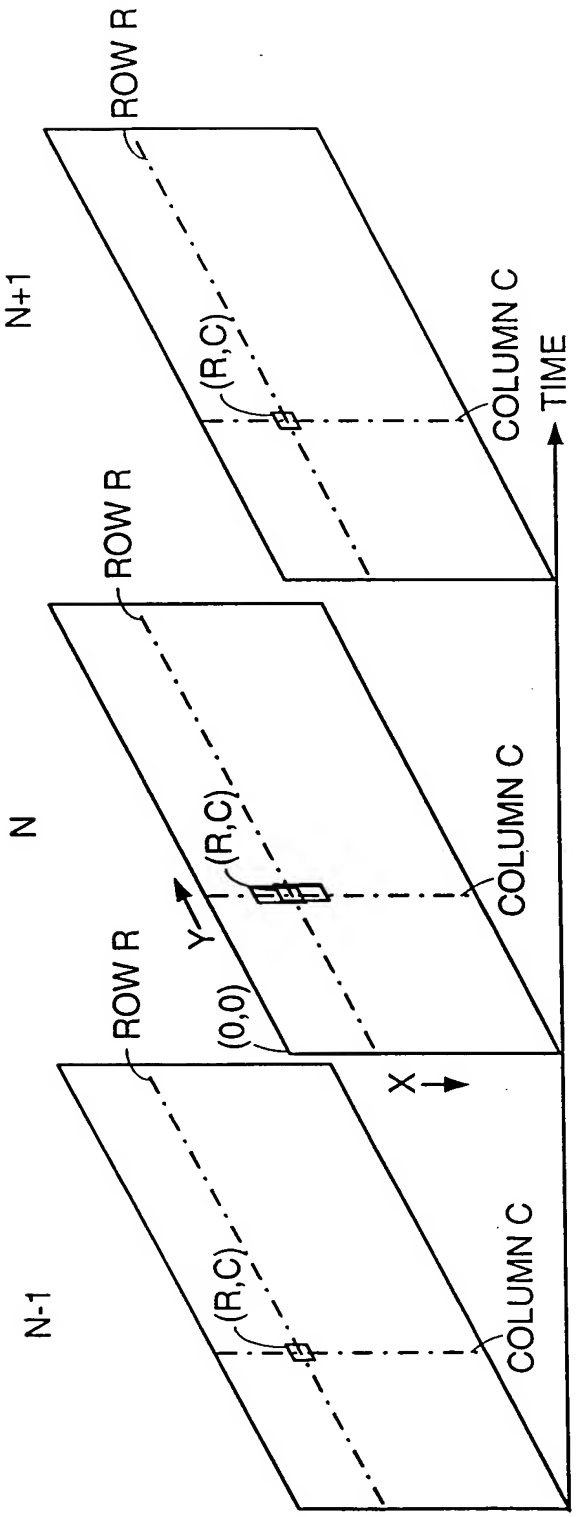

FIG. 11A

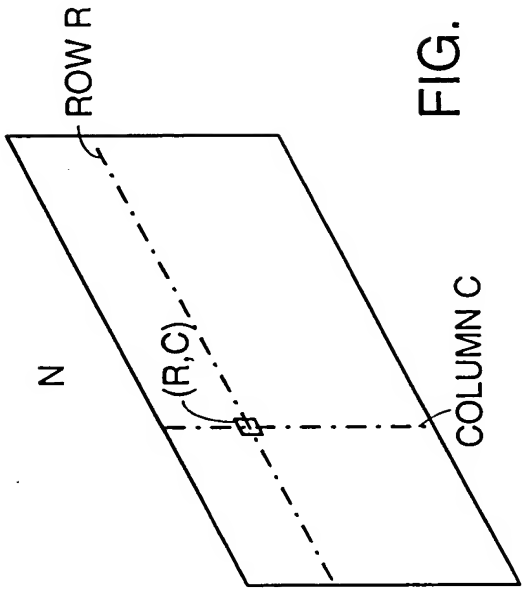

FIG. 11B

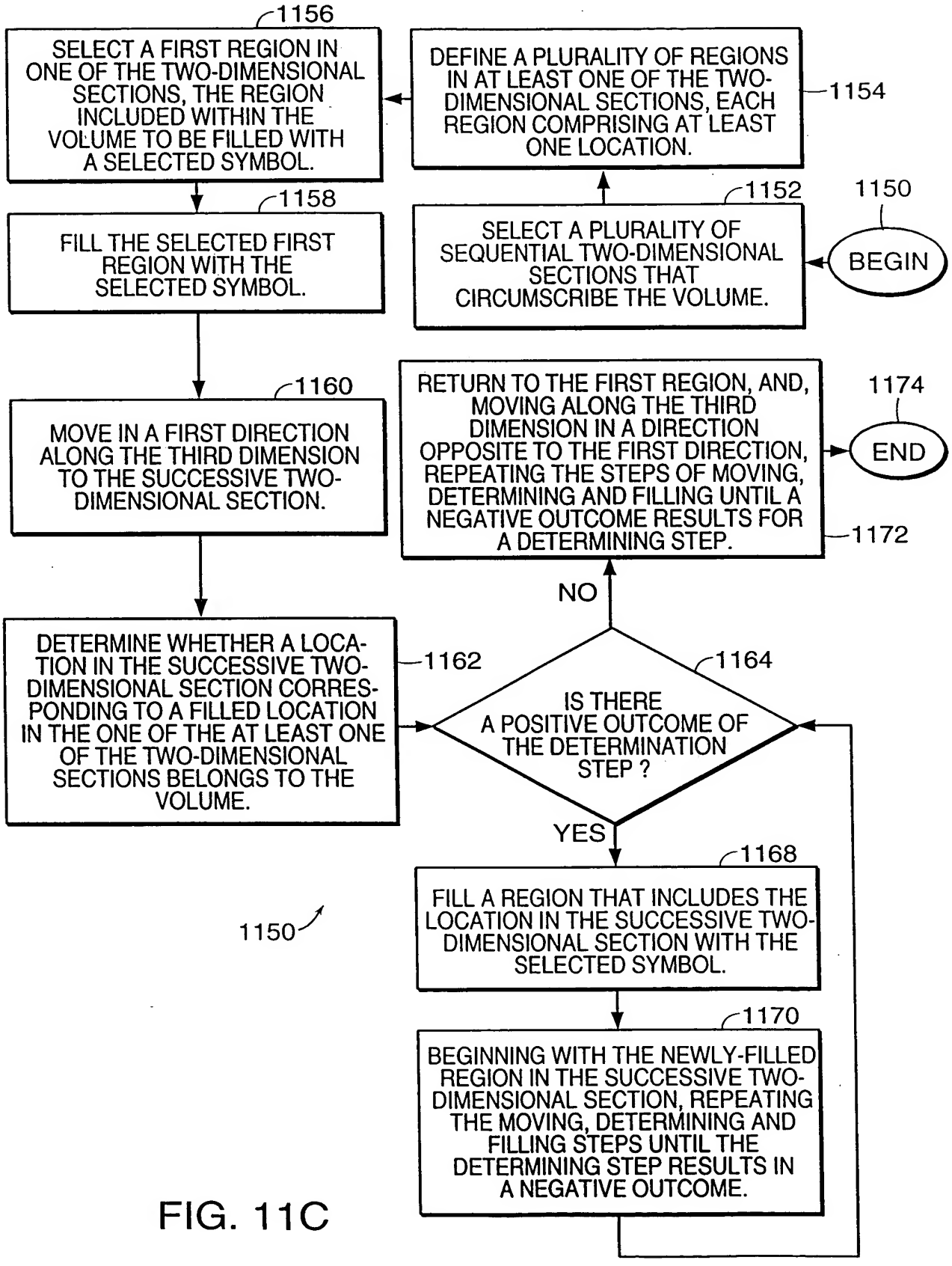
1156
SELECT A FIRST REGION IN ONE OF THE TWO-DIMENSIONAL SECTIONS, THE REGION INCLUDED WITHIN THE VOLUME TO BE FILLED WITH A SELECTED SYMBOL.
DEFINE A PLURALITY OF REGIONS IN AT LEAST ONE OF THE TWO-DIMENSIONAL SECTIONS, EACH REGION COMPRISING AT LEAST ONE LOCATION.
1154
1158
FILL THE SELECTED FIRST REGION WITH THE SELECTED SYMBOL.
1152
SELECT A PLURALITY OF SEQUENTIAL TWO-DIMENSIONAL SECTIONS THAT CIRCUMSCRIBE THE VOLUME.
1150
BEGIN
1160
MOVE IN A FIRST DIRECTION ALONG THE THIRD DIMENSION TO THE SUCCESSIVE TWO-DIMENSIONAL SECTION.
RETURN TO THE FIRST REGION, AND, MOVING ALONG THE THIRD DIMENSION IN A DIRECTION OPPOSITE TO THE FIRST DIRECTION, REPEATING THE STEPS OF MOVING, DETERMINING AND FILLING UNTIL A NEGATIVE OUTCOME RESULTS FOR A DETERMINING STEP.
1174
END
1172
NO
DETERMINE WHETHER A LOCATION IN THE SUCCESSIVE TWO-DIMENSIONAL SECTION CORRESPONDING TO A FILLED LOCATION IN THE ONE OF THE AT LEAST ONE OF THE TWO-DIMENSIONAL SECTIONS BELONGS TO THE VOLUME.
1162
1164
IS THERE A POSITIVE OUTCOME OF THE DETERMINATION STEP ?
YES
1168
FILL A REGION THAT INCLUDES THE LOCATION IN THE SUCCESSIVE TWO-DIMENSIONAL SECTION WITH THE SELECTED SYMBOL.
1170
BEGINNING WITH THE NEWLY-FILLED REGION IN THE SUCCESSIVE TWO-DIMENSIONAL SECTION, REPEATING THE MOVING, DETERMINING AND FILLING STEPS UNTIL THE DETERMINING STEP RESULTS IN A NEGATIVE OUTCOME.
1150

FIG. 11C

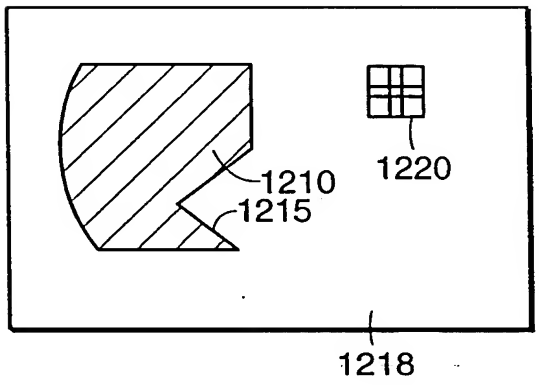

FIG. 12A

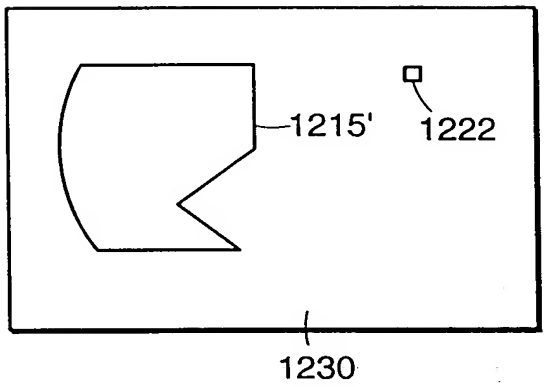

FIG. 12B

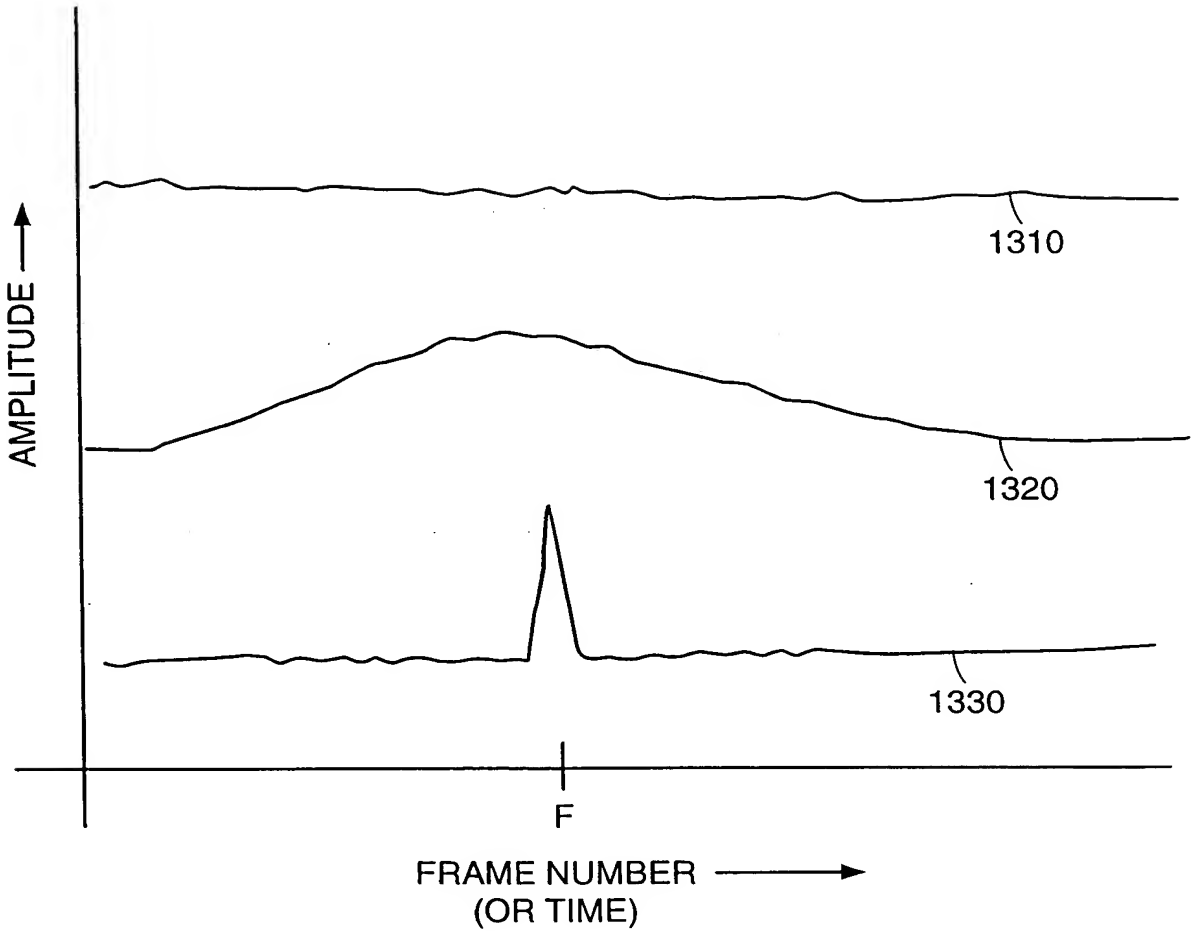

FIG. 13